RF Control System (V1)

Instructions for Fitting Upgrades

OPINT software revision 2.16
RIO software revision 3.7

Upgrade Options

The upgrade kit allows a minimally configured forage wagon system to be upgraded to a full-specification all options enabled system.
These instructions assume the OPINT and the RIO box are already fitted and operational on the forage wagon.

The extra features depending on upgrade options are:

- Basic weighing of wagon payload (scales fitted)
- Dispense feed per minute (scales and solenoid valve fitted)
- Speed compensated floor rate control (speed sensor and solenoid valve fitted)
- Floor rate control (solenoid valve fitted)
- Fully auto dispensing feed per metre (scales, speed sensor and solenoid valve fitted)

Component List

The upgrade kit consists of the following items:

1x Junction box for load cell wiring
1x Strip terminal connector (to join wires if junction box is blank)
1x Load cell/speed sensor cable (7 core) to junction box
1x SLA (sealed lead acid) 12V, 2.3Ah battery
1x Circuit board, part description v4-35A (input/output circuit board)
1x Circuit board, part description v4-41B (weigh circuit board)
1x Circuit board, part description TGT 82B (charge circuit)
1x Ribbon cable set for charge board

Available separately:
1x Speed sensor with cable

Wiring Schematic

White – Positive (12-24V DC)
Blue - Negative

1 Amp circuit (with fuse protection and key activation)

Operator interface (OPINT)

Speed sensor

Junction box

Load cells (4 or 6)

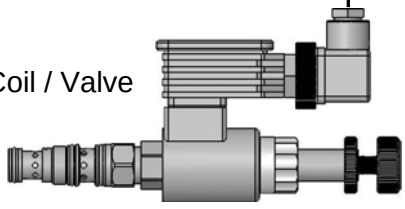
Scale/Speed sensor cable

Remote input output box (RIO)

Aerial

Power/Amplifier cable

Amplifier / Coil / Valve Assembly



12V DC
Brown – Positive
Blue - Negative

Tractor plug needs power and earth supplied to it.

5A (minimum) circuit with fuse protection and key activation.

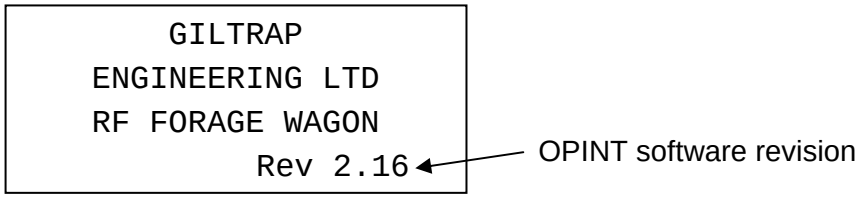
Trailer lights

Upgrade Installation Procedure

1. Change OPINT software parameters to reflect changes in hardware.
2. Install extra components into RIO box.
3. Fit the load cells if required.
4. Fit the speed sensor if required.
5. Fit the solenoid valve if required.
6. Fit the junction box to a suitable position on the wagon.
7. Connect the 7 core load cell/speed sensor cable into the junction box.
8. Connect the load cells to the junction box.

OPINT upgrade:

- To check the software version of the OPINT, connect it to a 12V power source. The version will display for 3 seconds.
- If a speed sensor is to be fitted, version 2.16 should be used. Version 2.14 is suitable for scales only.



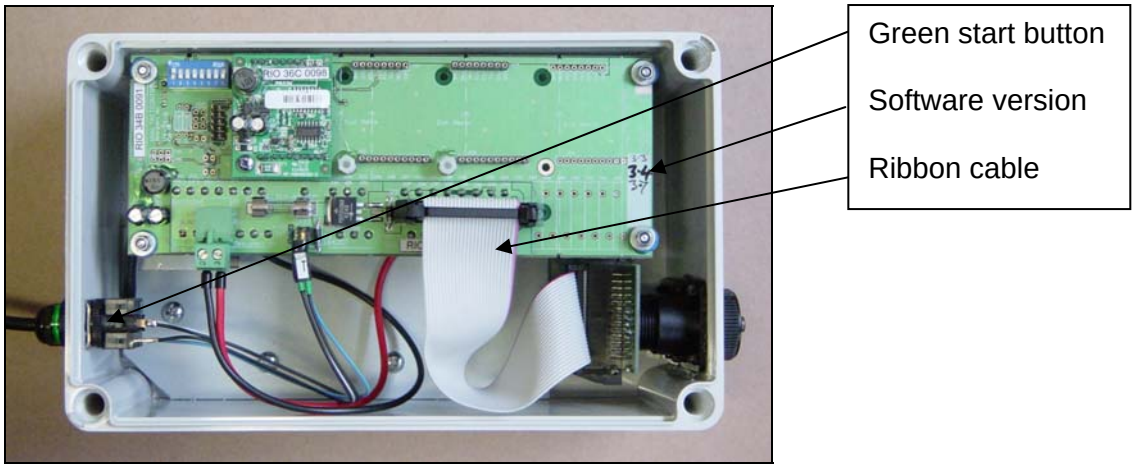
- To enter set-up, press ZERO and TARE together for 3 seconds or until the set-up screen appears.
- If the above screen is not displayed, continue pressing MODE until 'Forage Wagon Model' shows.

Function	Parameter (Forage Wagon Model)	Valve Fitted	Load Cells Fitted	Speed Sensor Fitted
Basic weighing of wagon payload only	Scales	No	Yes	No
Dispense feed per minute	Weight	Yes	Yes	No
Speed compensated floor rate control	Distance	Yes	No	Yes
Floor rate control only	Standard	Yes	No	No
Fully automatic dispensing feed per metre	Distance	Yes	Yes	Yes

- Press ⬆ until Weight, Distance (if speed sensor is fitted) or Scales is displayed.
- Press ENTER to accept.
- Continue pressing MODE to check the remaining parameters are correct.
- Press ESCAPE to exit the configuration screen and remove power from controller to reboot.

RIO box upgrade

1. Disconnect the tractor power (9-pin plug) from the side of the RIO box.
2. Remove any built up dirt from around the lid and remove the cover from the RIO box and check that there are no lights on the circuit board.
3. Check that the white box on the wagon (Remote IO or RIO box) has a green start button and a ribbon cable. The software version should be 3.7. Contact Giltrap if these features are not present as they will require upgrading.



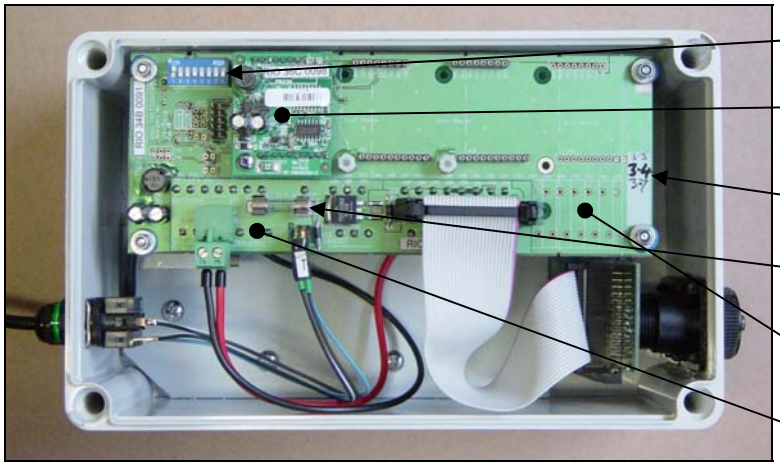
4. Either remove the RIO box from the forage wagon (preferable) or perform the upgrade while the RIO box is fitted (more difficult but possible).
5. Remove the screws holding down the base plate in the RIO box. Carefully lift the metal plate up and fit the 12V battery in underneath. The battery should be fitted so that the terminals of the battery are in the lowest position. The base plate holds the battery in place.
6. If a charging circuit board is supplied, fit it now according to instructions supplied.
7. Refit the screws to hold down the base plate and battery.
8. Fit the red and black flying leads to the correct battery terminals using long nose pliers. The green plug should be connected to the main circuit board once the circuit boards have been fitted.
9. Fit the circuit boards. Remove the 2 circuit boards from the antistatic bags and place them on top of the antistatic bags ready to install. The boards may need trimming to fit along side each other. Use 200 grade sandpaper to reduce the width of the board taking care that no circuit tracks or components are damaged. Fit the weight board (labelled v4-41B) to the 2nd slot (2nd from left hand side). Fit the Input/Output board (labelled v4-35A with 4 green rectangular LEDS mounted vertically and at the bottom of the circuit board) in the 3rd slot from the left hand side of the motherboard. Make sure the screws are used to hold down the circuit boards in place (small Philips screwdriver).

CAUTION!! THE PINS ON THE BOTTOM OF THE CIRCUIT BOARDS ARE VERY EASY TO BEND. IF BENT, YOU WILL MOST LIKELY NEED A NEW CIRCUIT BOARD.

10. Fit the RIO box back onto the wagon.
11. Connect the Load Cell/Speed Sensor Cable to the RIO box.

Remote IO Box Layout

Standard RIO Box



RF Channel Switch

Amplifier Controller Board (36C)

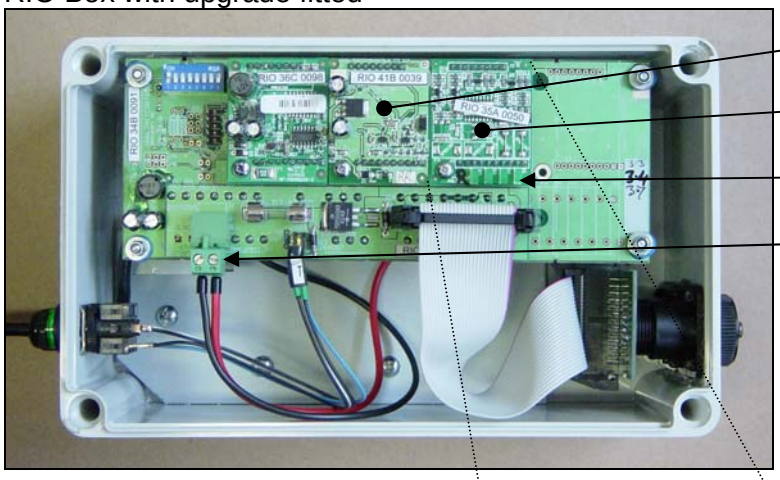
Software version

Fuse

Motherboard (34B)

Daughterboard (47B)

RIO Box with upgrade fitted

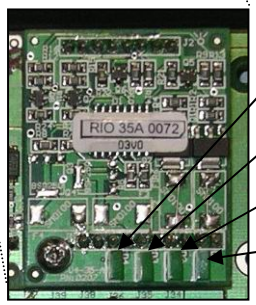


Weight Board (41B)

Input/output Board (35A)

LEDS (see detail)

Battery Plug



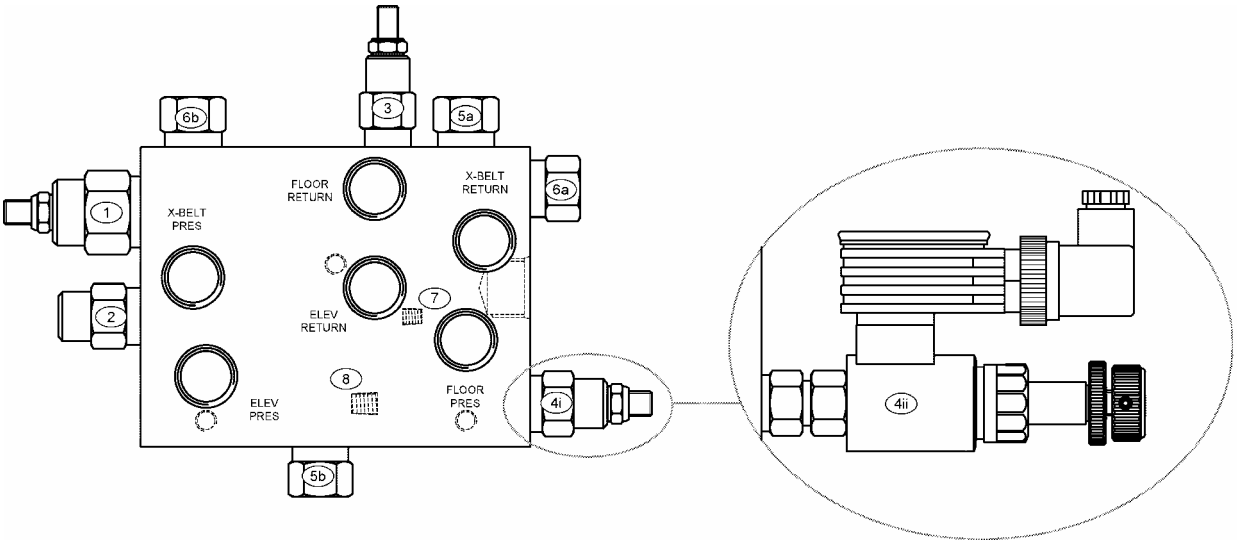
Speed sensor

Tractor power

Power on

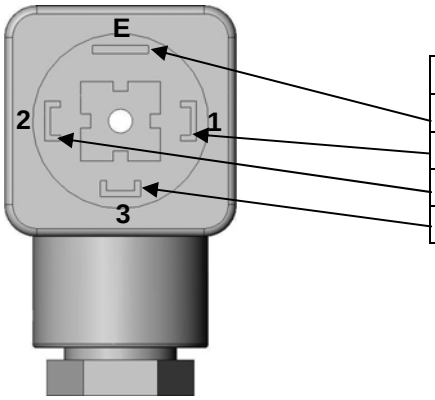
Not used

Fitting the Valve Solenoid



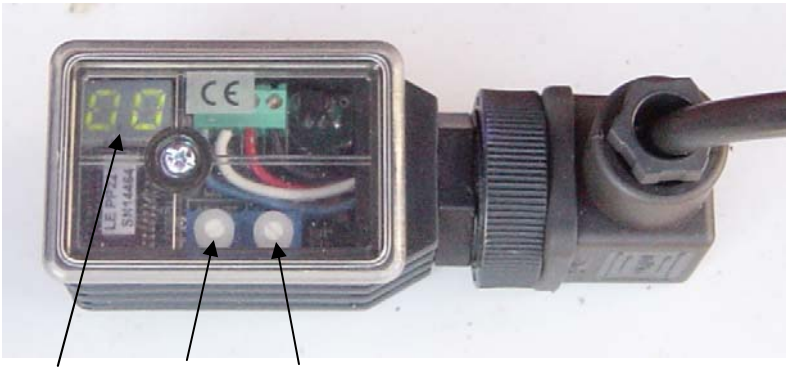
1. Remove the manual control valve (4i) and handle. Replace with the components (4ii) as pictured.
2. Find the power cable entering the RIO box. It should have a secondary short cable taped up. Fit the amplifier plug to this short cable as shown below.
3. Check the amplifier settings. They should be the same as the next page.
4. The new type valve features a manual override knob. This knob should be screwed anti clockwise and the lock knob tightened during normal use.
5. In case of electronic malfunction, loosen the locknut and screw the large knob clockwise until the machine is feeding satisfactorily.

Amplifier Plug Wiring



Pin	Colour	Description
E	Blank	Not used
1	Brown	Positive
2	Blue	Ground
3	Green/Yellow	Command Signal

Amplifier Set-Up Procedure



Display Adjust Select

When powered up, the display shows the input or output signal, as pre-selected. To enter set-up mode rotate SELECT. The decimal points will start to flash and the display will show the settings sequentially: HI, LO, UP, dn, Cd, dF, di and SA.

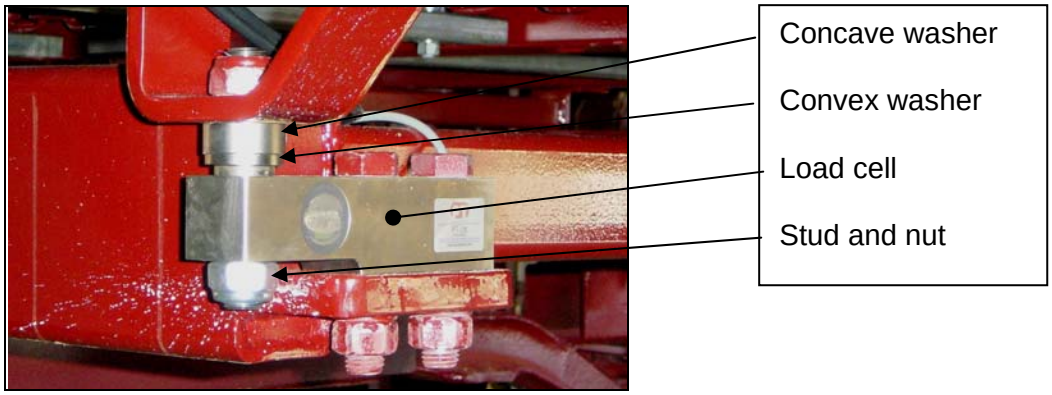
When you reach the setting that you want to modify, rotate ADJUST up or down to the desired value. To modify another setting, rotate SELECT again and repeat. The driver is fully functional during the set-up procedure with any adjustments effective immediately. In order to write the new settings in the memory and return to normal mode of operation, rotate SELECT until the display shows SA, and then rotate ADJUST or wait for 100 seconds.

Note: If you do not want to keep the new settings, you must disconnect the driver from the power supply before the end of 100 seconds in order to restore the old settings.

Display	Description	Range	Setting
HI	High	25-98	45
LO	Low	02-HI	00
UP	Ramp up	00-99	00
dn	Ramp down	00-99	00
Cd	Command deadband	00-05	00
dF	Dither frequency	08-30	16
di	Signal displayed	00 or 01	00

Fitting the Load Cells

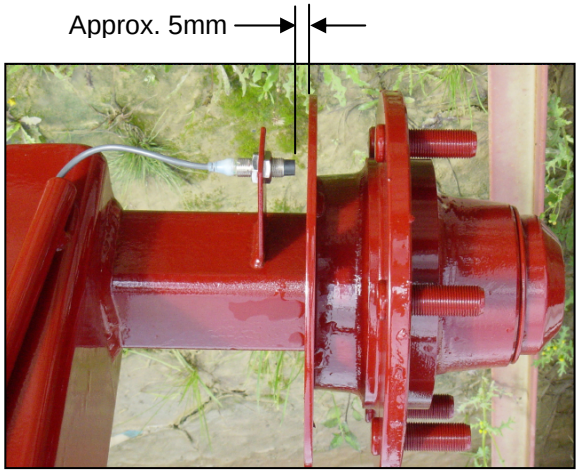
- Check that the cab controller software version is 2.14 or later.
- Fit the studs to the load cell first before fitting the load cells to the machine using the bolts provided.
- Lower the top half of the wagon onto the studs.
- Tighten the top nut then back off ½ turn.
- Route the wiring through the pipe/brackets provided through to the junction box taking care to keep the wiring tidy and away from moving objects.
- Connect wires as below.



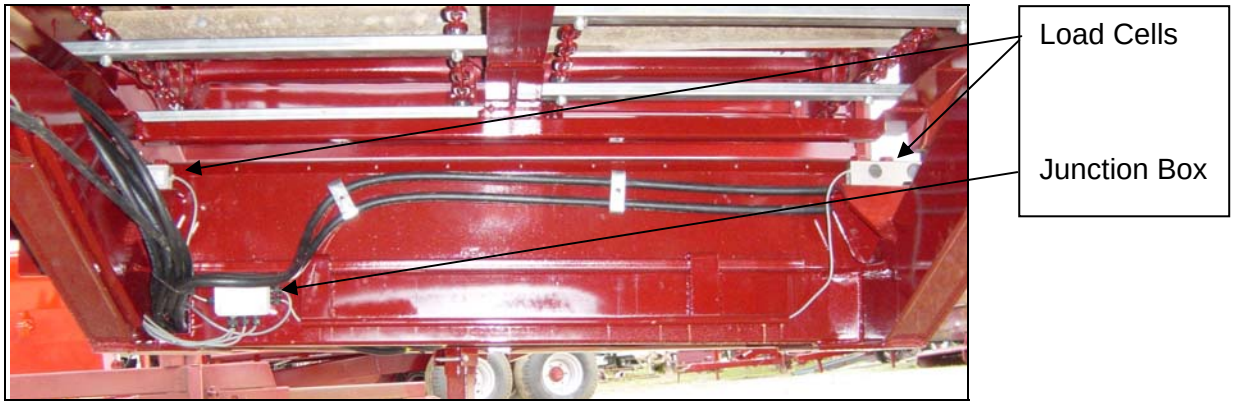
Recommended Load Cell Torque Settings
M20 - 380Nm (280 ft/lbs)
M24 - 660Nm (490 ft/lbs)

Fitting the Speed Sensor

- Check that the cab controller software version is 2.16 or later.
- The speed (proximity) sensor is to be fitted to the axle. Most RF series wagons will have the mountings for the sensor already fitted.
- Take care when running the cable that there is enough slack to allow the axle to fully oscillate.
- Connect into the junction box as below.
- The sensor has to be adjusted halfway between the range of being always on and always off. This is approximately 5mm between the end of the sensor and the wheel plate.



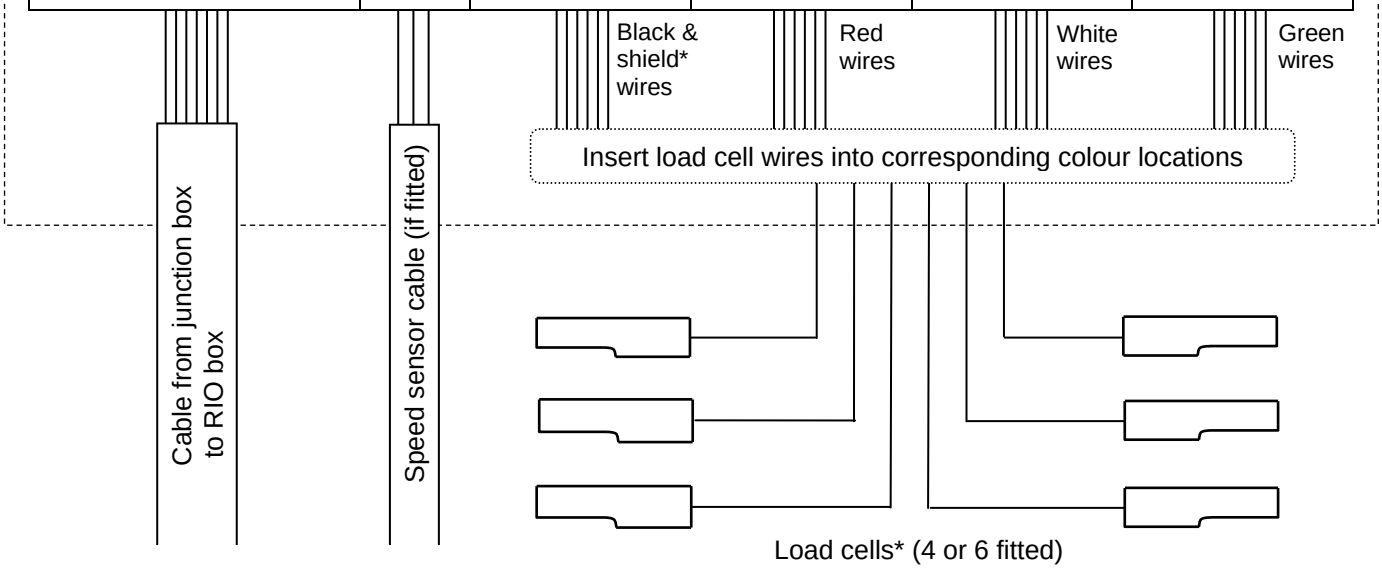
Fitting the Junction Box



1. It is recommended that the junction box be fitted on the main cross member at the rear of the drawbar on the left hand side. Using the junction box as a template, drill and fix the box to the chassis (with most of the glands pointing down) using self-tapping screws through the proper mounting holes in the box.
2. A spring cage connector is used as a junction point for all wires. To use them, insert a small blade screwdriver into the hole above where the wire will go (smaller hole of the two) and lever up. A jaw will open in the hole below the screwdriver into which the wire can be inserted and then the screwdriver can be released. Wriggle the wire to check for a secure connection.
3. Connect each of the seven cores to the cage connectors in the junction box. These are adjacent to the large diameter cable gland and are labelled with symbols and have two blank holes labelled SDH and SHD.
4. Connect the load cells (if fitted) to the connectors in the junction box.
5. Connect the speed sensor (if fitted) to the connectors in the junction box.

Junction Box Connections

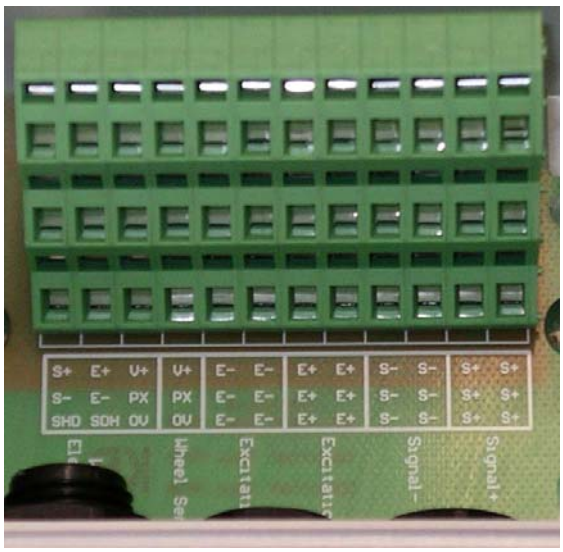
Blue (S+)	White/ Blue (E+)	Green (V+)	Brown (V+)	Black & Shield (E-)	Black & Shield (E-)	Red (E+)	Red (E+)	White (S-)	White (S-)	Green (S+)	Green (S+)
White/ Orange (S-)	Black (E-)	Orange (PX)	Black (PX)	Black & Shield (E-)	Black & Shield (E-)	Red (E+)	Red (E+)	White (S-)	White (S-)	Green (S+)	Green (S+)
Empty (SHD)	Empty (SDH)	White/ Green (OV)	Blue (OV)	Black & Shield (E-)	Black & Shield (E-)	Red (E+)	Red (E+)	White (S-)	White (S-)	Green (S+)	Green (S+)
Wagon Electronics			Wheel sensor	Excitation –		Excitation +		Signal -		Signal +	



Notes:

*Tru-test (Kelba) cells: All wires from each load cell go in their own hole except black and shield wires which get wired together.

*PT cells: All wires from each load cell go in their own hole except black and shield wires which get wired together. Blue & brown wires are not used and get folded back and taped to the cable.



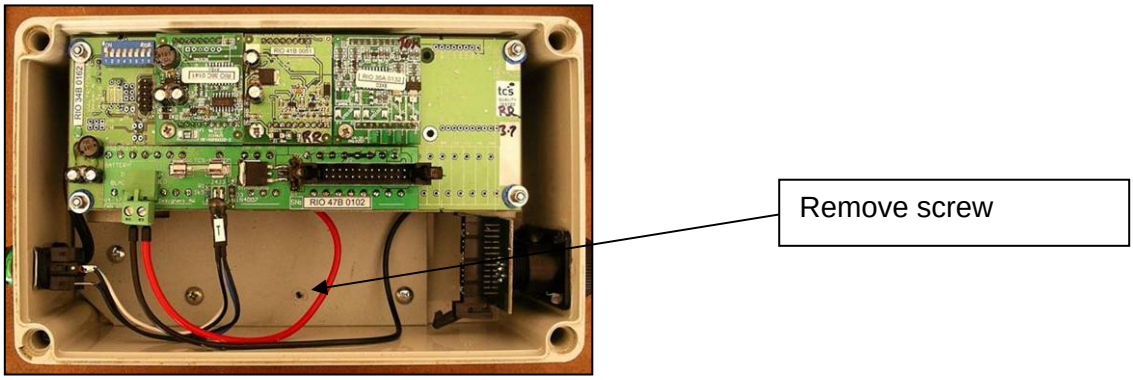
Fitting the In-line Battery Charging Circuit Board

Parts Supplied

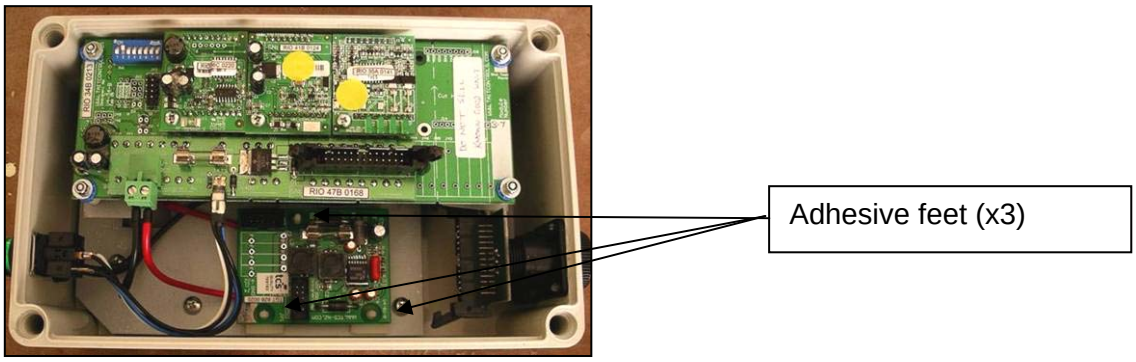
- Circuit board
- Ribbon cable set

Fitting Instructions

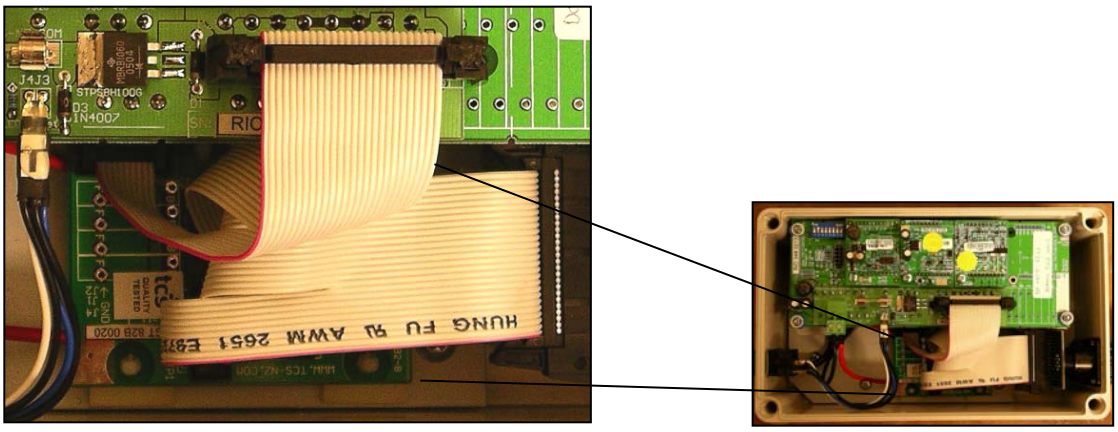
1. Remove the lid from the white RIO box.
2. Remove the ribbon cable and centre screw from the metal base plate.



3. Wipe the base plate clean with a dry cloth then remove the backing tape from the adhesive feet on the circuit board and stick onto the metal base plate so the remaining screws can still be accessed.



4. Install the new ribbon cable. It is multi-directional but be sure that the small plugs are fitted to the closest large plug. It is possible to fit connectors in the incorrect place and although this would not cause damage, it would result in the system malfunction.



5. The battery can now be charged by leaving the ignition key on without the tractor running. The charge circuit will boost the battery to optimum voltage and not overcharge.

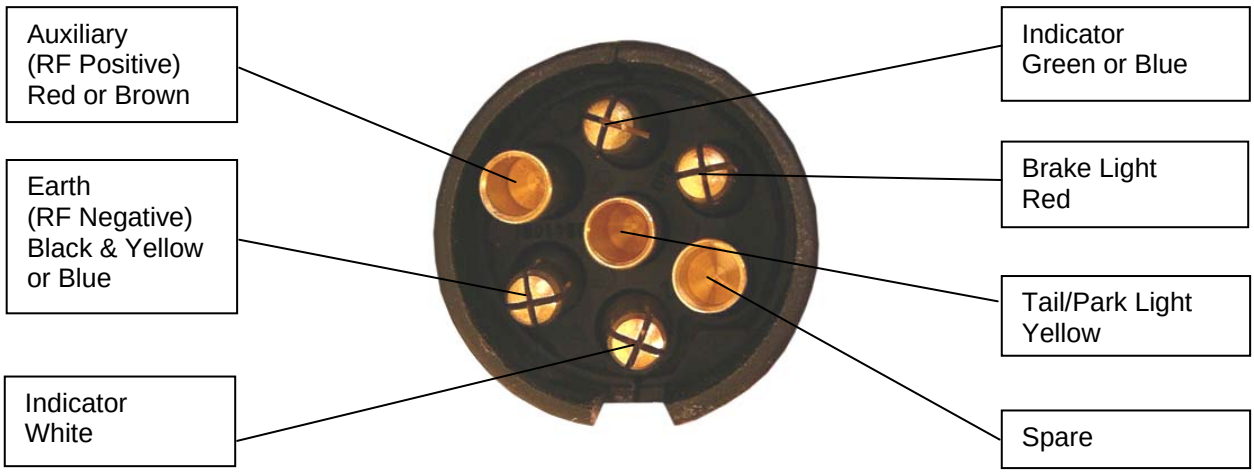
Setting up a 240V 3-pin Charger System

Note: Not all machines have this component fitted. It is an optional extra.
Do not use this charger in conjunction with the inline charging circuit (pictured on the previous page), it will burn out.

Parts Supplied
13.8VDC @ 0.8A 3-pin Charger

7-pin Female Tractor Plug

Trailer Plug Wiring Connection (viewed from front, looking at pins)



Important Note:
While this wiring configuration may not be suited to all tractors, it is important that the wiring is checked during installation to ensure that the RIO box has power and is able to draw 5A constantly when the ignition key is turned on.

240V Auxiliary Charging
When fitting a plug to a charging adapter, check the voltage of each pin to determine the correct wiring layout. The plug attached to the charger **MUST** be wired the same as the tractor.

Do not use this charger in conjunction with the inline charging circuit (pictured on the previous page), it will burn out.

Quick Check Settings

Note: These are factory default settings. Some machines will require different settings.

Monitor Set-up Procedure

- To enter set-up, press ZERO and TARE together for 3 seconds or until the set-up screen appears.
- Press MODE until the appropriate parameter is displayed.
- Press ⬆ or ⬇ until the parameter is the correct setting.
- Press ENTER to accept.
- Press ESCAPE to exit the configuration screens.
- Remove power from controller to reboot.

Forage Wagon Model	Standard, Weight, Distance or Scales
Scale Damping Value	1.00 sec
Load Cell Type	5000.00 kg
Number Of Load Cells	4.00
Load Cell Sens.	2.20mV/V (Kelba) or 2.00mV/V (PT)
Weight H/W Rev	V4-41-B
Scale Hysteresis	10.00 kg
Scale Increments	10.00 kg
Valve Min. Cal.	4017.00 cn.
Valve Max. Cal.	3667.00 cn.
Wheel Diameter	760.00 mm
No. of Wheel Holes	15.00
RFID Number	1.00 (must match RIO Box settings)
Low Batt Level	11.00V
Startup V. Set. Dis.	85.00%
Startup V. Set. Kg/m	85.00%
Min. V. Setting	30.00
Min. F. R. Kg/Min	400.00kg
Speed Mode Min Speed	1.00 km/h
Speed Mode Max Speed	6.00 km/h
Speed Mode Strt Time	1.00 sec
Dist. Before Finish	1.00 m

If any values were changed, press ENTER before continuing to the next setting.
Press ESCAPE to exit.

Final Check

Check that the power circuit board is working correctly:

Connect the internal battery leads to the battery (red is positive, black is negative) and connect the battery lead plug to the green socket at the left corner of the circuit board.
The RIO box will NOT turn on yet – this is normal.

Plug in the 7 pin light/power plug to the tractor and turn on the ignition. This applies power to the RIO box.
With the RIO box cover still removed, check that the 2 green LED's (the two centre LED's of the four) on the input/output board are glowing.
Turn the tractor ignition off and check the green LED's. The third from left (power on) should be glowing while the second from left (tractor power) should be off.

After a time delay of 30 minutes, the RIO box should power down. If tractor power is reapplied, this countdown timer is reset.

Note: To force power off, disconnect the internal battery and the tractor plug.

Check that there is RF communication:

There should be a (T) symbol displayed in the bottom right hand side of the screen.

Check that the amplifier (if fitted) is working correctly:

Select Standard (or Std) mode.
Press START on the OPINT and adjust the feed rate to 100%. The amplifier display should read between 97-99%. Check again by changing the feed rate to 50% and 0%. The display should show an appropriate number.

Check that the load scales (if fitted) are weighing correctly:

This can be done by applying a load to the load cells after zeroing the scales.
If the weight display is changing significantly, altering the mounting location of the RF aerial will help. Charging the internal battery will help if the weight is unstable when unplugged from the tractor. The source voltage will be displayed on the lower line of the screen.

Check that the speed sensor (if fitted) is working correctly:

Jack up the wheel with the speed sensor fitted and check that the sensor light flashes while the wheel rotates.
The green LED (first on left of the 4 square shaped LED's) on the input/output board should also flashes at the same time as the speed sensor light.

In distance mode, dial up a distance of say 20 metres on the OPINT and press START. Rotate the wheel 2-3 revolutions (forward or reverse) and check that the distance is decreasing.

All complete – ship with battery connected (it will power down after 30 minutes to preserve power).

Fault Diagnosis

Problem	Reason	Solution
Green light on RIO box won't illuminate when wagon is plugged into tractor	Power not getting to RIO box	Check fuse in RIO box
		Check wiring from tractor
Green light won't stay illuminated when unplugged	Internal battery flat or not holding charge	Plug wagon into tractor to recharge battery
No communication indicator (☩)showing on OPINT	RIO box not active	Check fuse in RIO box. Check wiring from tractor. Press green button on RIO box if fitted
	Signal interference from another machine	Change RF channel
	Distance to great between RIO and OPINT	Move closer together
	Signal blocked by large object.	Move away from object
	Aerial not working correctly	Check aerial for damage or incorrect position
Scale reading fluctuates	Low internal battery voltage	Check fuse in RIO box. Check wiring from tractor
	Loose or faulty load cell wiring	Check load cell wiring
Floor won't move forward while in Standard mode.	System not started	Press START on keypad
	Feed rate too low	Increase feed rate
	Faulty solenoid coil	Replace coil
	No power to unit on wagon	Check plugs and wiring
Floor not moving forward in Distance or Speed mode	Faulty proximity sensor or wiring	Replace sensor
	No power to unit on wagon	Check plugs and wiring
Floor won't stop coming forward	Faulty override cartridge	Replace valve cartridge (with hydraulic type)
Fully configured RIO box won't hold power when tractor source removed	Circuitry not holding power	Replace input/output board
	Battery not fully charged	Recharge battery
Scales won't read at all or display 0	Faulty weight board	Replace weight board
	Loose or faulty load cell wiring	Check load cell wiring
Keypad unable to enter setup	Faulty keypad	Return for repair
OPINT will not store settings correctly	Memory not operating correctly. Possible faulty memory chip.	Return for repair
Voltage reading displays lower than when voltage is tested	Incorrect weight board version in V2.16 software	Change OPINT parameter